FLIGHT

The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

May 31	**Wilbur Wright Lecture, "The Relation between Aeronautical Research and Aircraft Design," by Dr. Joseph Ames, before R.Ae.Soc.**
June 23	**Grosvenor Challenge Cup, Lympne**
June 25–30	**International Air Congress, London**
June 30	**R.A.F. Aerial Pageant, Hendon**
July 20–21	**Air Race for King's Cup**
July 16	**Unveiling of R.A.F. Memorial by H.R.H. The Prince of Wales**
July 20	**Gothenburg Exhibition**
Aug. 1	**Entries close from British Competitors for Schneider Cup**
Aug. 3–14	**Rhön Gliding Competition**
Aug. 6	**Aerial Derby**
Aug. 6–27	**French Gliding Competition, near Cherbourg**
Aug. 8–12	**F.I.A. Conference, Gothenburg.**
Sept.	**Light 'Plane and Glider Competitions**
Sept. 23	**Gordon Bennett Balloon Race, Belgium**
Sept. 28	**Schneider Cup Seaplane Race at Cowes**
Oct. 14	**Beaumont Cup Race at Istres, France**
Dec. 1	**Entries close for French Aero Engine Competition**
1924	
Mar. 1	**French Aero Engine Competition.**

EDITORIAL COMMENT.

THE inclusion of the Secretary of State for Air, Sir Samuel Hoare, in Mr. Baldwin's Cabinet is a triumph—if a little late—for the realm of the Air. In commenting upon the appointment of Mr. Baldwin to the position of Prime Minister last week, we ventured to suggest that this appeared to be an excellent opportunity for remedying a neglect which should have been rectified long ago. It is now admitted, even among those who are far from being pro R.A.F., that the air service already ranks at least equal in importance with the other two services, and that there is no longer any doubt that as time goes on this importance will increase. The position of the Air Service of apparent inferiority in having no representative in the Cabinet was thus intolerable, and the recognition which the air has now been given by the inclusion of Sir Samuel Hoare in the new Cabinet is extremely gratifying. We take this step as an indication that it is the intention of the present Government to see that for the future there shall be real progress with the R.A.F. and with the question of home defence, and no turning back. The lead in the air which Britain has lost is still, fortunately, not irremediable, but instant and vigorous action is necessary. The very fact that our Secretary of State for Air is now a member of the Cabinet will be a long stride towards ensuring that the air shall be given a fair hearing, and so satisfied are we of the vital importance of the claims of aviation that we consider such fair hearing all that is necessary to ensure that any shortcomings of the past shall be made good. We therefore tender our heartiest congratulations to Sir Samuel on his promotion to Cabinet rank, in the certain conviction that the good preliminary work which he has already done for aviation will now be continued and extended under more favourable circumstances.

Cabinet Recognition

* * *

The Air Ministry and Racing Machines

On another page of this issue of FLIGHT will be found an announcement by the Air Ministry to the effect that the Air Council has decided to purchase in the future, the British machine which wins, each year,

the Aerial Derby and the Schneider seaplane race. The announcement reads somewhat humorously, as it appears that the Air Council takes it for granted that a British machine will always win the Schneider Cup Race. Although this is a compliment to British constructors, it does not follow that we shall have the good fortune to carry off this coveted trophy always. Even this year we shall be pitted against formidable competitors from France, Italy and the United States. Nevertheless, the offer is to be welcomed as showing willingness to help, in a material form, and in the case of the Aerial Derby the offer to purchase the winning machine does definitely mean the certain purchase of a British machine, as the prizes offered in this event are not such as to be likely to attract any foreign competitors.

We have repeatedly pointed out in these columns the enormous importance of giving encouragement to the constructors of racing machines, and have pointed out as an example the way in which the American Government helps American constructors by placing orders for racing machines to take part in such races as the Pulitzer, and to establish world's records. While the offer to purchase in the event of winning is far from being the same as an order for a machine to take part in a race, it is at any rate some encouragement to constructors, and should help greatly towards a better entry list for the Derby. Unfortunately, however, the offer comes a little too late to be of much use this year. The production of a racing machine cannot be undertaken at a moment's notice, and it is quite conceivable that more than one firm would have built a machine, had this offer been made a couple of months ago.

A certain amount of uncertainty seems to prevail as regards the interpretation of the sentence "provided the aircraft is, in each case, British designed, built, and owned, and is not of a type which has previously won either race." What will determine whether or not a machine is of the same type as that which won the previous race? For instance, suppose Mr. Folland put smaller wings on the "Bamel" (if that be possible), or changed it into a monoplane. Would that make it a new type, or would it still be regarded as the "Bamel"? Or if he put the wings on the wrong way and made the machine fly tail first, would it still be the 'Bamel"? Or if the Supermarine "Sea Lion" were given another step, or had one subtracted, or had her struts raked instead of straight, would she still be considered to be the "Sea Lion," or would she be entitled to be known as a new type? We are not asking these questions idly. It is possible to foresee that considerable controversy might arise out of the definition of a "new type." It may be that the wording is merely unfortunate, and that the Air Council is willing to take a reasonable view of the matter, but it would be a good thing if a somewhat more precise statement could be made. It may save heartburnings in the long run.

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The "Joy-Stick" Action

The result of the deliberations of the French Supreme Court in the action brought by M. Robert Esnault-Pelterie has been the award to the patentee of the "Manche à Balai," or "joy-stick," of no less than 7½ million francs, payable partly by the French State and partly by certain French aircraft constructors. Following the taking action in France, it appears that M. Esnault-Pelterie issued writs against certain British constructors for payment of royalties on machines sent to France during the War. With the ethics of the case we are not concerned here. If M. R. E. P. wishes to impose upon British constructors payment of royalties on the control stick fitted on machines sent to France in order to assist our Ally in her struggle, he has, no doubt, every legal right to make the effort, whether it may be regarded as cricket or not. What matters is that if Pelterie persists, and the Courts decide he is right, heavy sums may well be demanded in which British constructors may be very much concerned.

In looking at this matter one can only come to one conclusion—that this is not a question to be decided by private firms. The machines sent to France were built to the order of the Government, were used in the business of the nation, for purposes of carrying on the War, and that, consequently, any action to be taken on the subject of royalties, patents, etc., should be the business of the Government. Incidentally one can foresee not inconsiderable difficulties in determining with any degree of exactitude whether certain of the machines sent over were operating in France, in Belgium, or in Germany.

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Royal Air Force Memorial Fund

A MEETING of the Executive Committee was held on May 9, the following being present: Lord Hugh Cecil (Chairman), Dame Helen Gwynne-Vaughan, Mrs. Barrington-Kennett, Mrs. L. M. K. Pratt-Barlow, Sir Charles McLeod, Air Vice-Marshal J. F. A. Higgins, Air Commodore H. R. M. Brooke-Popham, Lieut.-Commdr. H. E. Perrin.

The amount of grants sanctioned by the Grants Sub-Committee since the previous meeting of the Executive Committee on March 28, amounting to £757 3s. 9d., was approved. The number of cases dealt with since the last meeting was just over one hundred.

The Hon. Treasurer announced that the sale of "Woodcote," Ascot, had been at last carried out, and it was hoped at a very early date to commence the issue of grants under the "Salting Benefaction Fund," in aid of the education of the sons and daughters of officers, past and present, of the Royal Air Force, preference being given to the children of officers who fell in the War or died as the result of service in the War.

The next meeting of the Executive Committee was fixed for June 31, at 3 p.m.

Subsequently a meeting of the War Memorial Sub-Committee, with Lord Hugh Cecil in the Chair, took place, and many details concerned with the unveiling of the War Memorial at the Whitehall Stairs, Victoria Embankment, which is to be performed by H.R.H. the Prince of Wales at 12 noon on Monday, July 16 next, were discussed at length.

International Air Races.—Air Ministry's Offer

THE Air Ministry announces that, with a view to encouraging the entry by British aircraft constructors of British racing aircraft in international air races, the Air Council have undertaken, in this and future years until further notice, to purchase, for a sum not exceeding £3,000 in each case, the winning aircraft (without engine) in both the Aerial Derby and the Schneider cup races, provided that the aircraft is, in each case, British designed, built, and owned, and is not of a type which has previously won either race.

The Council consider that the production of aircraft capable of winning these events represents a definite advance in design, and official experiments will be undertaken after the purchase so that the full research and military value of the machine may be obtained.

The Aerial Derby is an international race, which is being held this year at Hendon on the August Bank Holiday, open to any type of landplane or amphibian, and the Schneider cup race, which will take place this year at Cowes on September 27 and 28, is the principal international race open to seaplanes or amphibians.

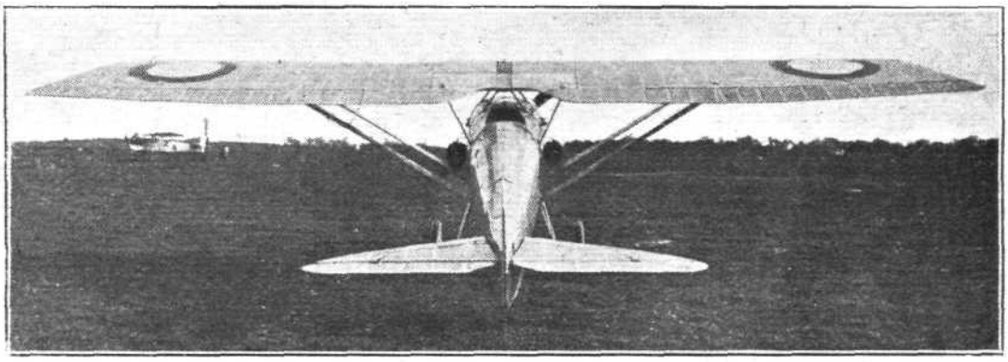
FLIGHT

A NEW FRENCH ALL-METAL AEROPLANE

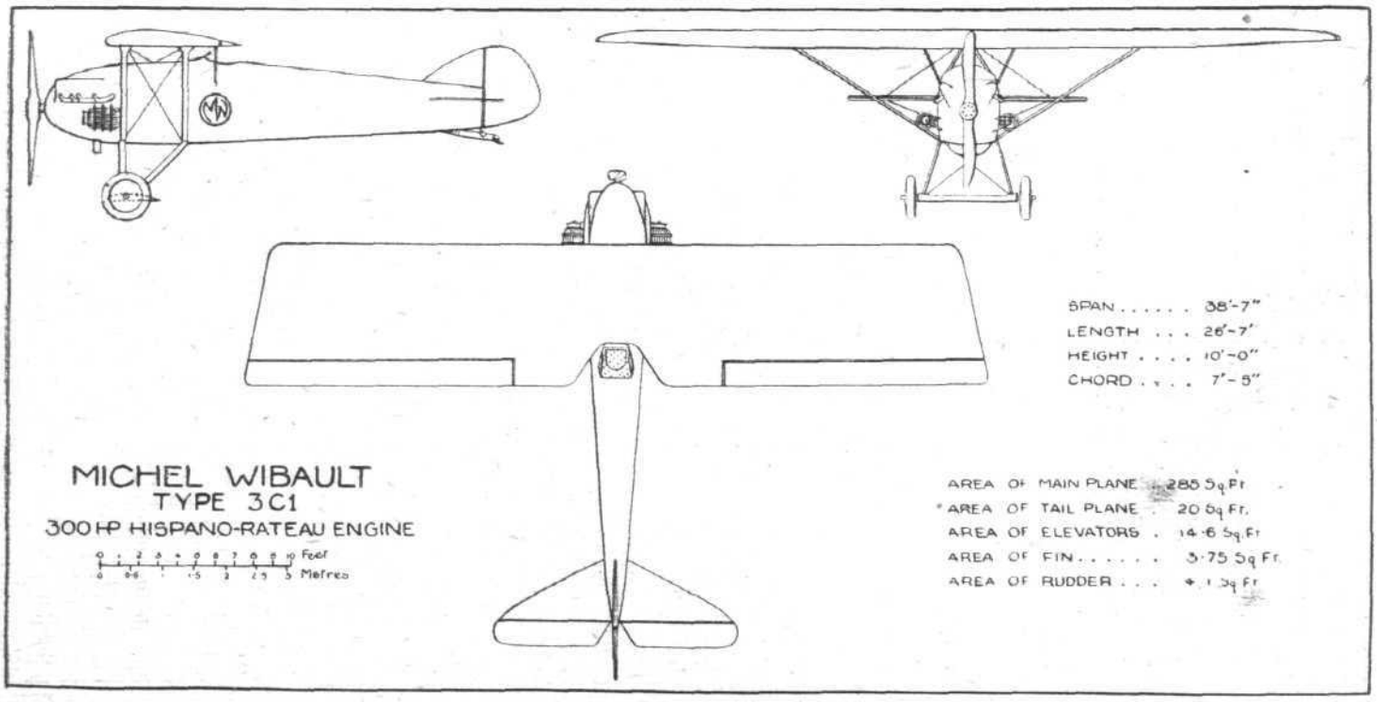
The Michel Wibault 3 C.I.

GREAT efforts are being made in France with all-metal construction, and whether or not one agrees with the manner in which French engineers attack the problem, one must admit that they are very much in earnest, and that very considerable progress is being made. It is a somewhat curious fact that whereas in this country we are not allowed to use Duralumin for highly-stressed parts, both in Germany and in France this material is being extensively used, and, apparently, with no ill effects on the strength and life of machines. One cannot help wondering a little whether it is a case of "all being out of step except our John." Among the French designers who have long occupied themselves with metal construction is M. Michel Wibault, who exhibited a metal wing as long ago as the 1921 Paris Aero Show. Sketches of this wing were published in our issue of January 12, 1922. This wing, which, like the rest of the B.N. 2, was built by Pierre Levasseur, was, at that time, well ahead of the majority of other French-designed metal wings, being reasonably cheap

The Wibault 3 C.I.: Three-quarter front view.



The Wibault 3 C.I.: Rear view.



THE MICHEL WIBAULT 3 C.I.: General arrangement drawings.

to make and yet possessing a good strength/weight ratio. We have recently obtained particulars of the latest Wibault machine, which is also constructed mainly of Duralumin, although certain very highly-stressed fittings are made of steel.

This machine, the 3 C.I., is designed as a fast single-seater fighter for high altitude work, but if desired may be used for long-distance photographic reconnaissance. Among the desiderata aimed at by the designer are high aerodynamic efficiency, great manœuvrability, maximum range of vision, good machine gun accessibility and a high factor of safety.

In weighing the various problems it was decided to make the machine of metal, all except the covering, which is ordinary doped fabric. The necessity for a good view resulted in a parasol monoplane arrangement, and the desire for good aerodynamic efficiency pointed to the cantilever wing. Since, however, a very large factor of safety was essential, it was decided that a small amount of external bracing would not affect the efficiency greatly, while it would enable the wing to be made very strong. Consequently the actual machine incorporates a fairly thick wing, raised above the fuselage, and braced on each side by one pair of struts. The factor of safety is claimed by the makers to be 19, and the wing is stated to have withstood a sand load of more than 50,000 lbs. The wing section used is one developed by M. Wibault. It has a flat bottom surface, and the leading edge is very much rounded. The depth is not extraordinary, as it was found that a wing of medium thickness with external struts gave better results than a thicker wing without struts. The maximum L/D of the wing is stated to be just under 20.

The wing of the Wibault 3 C.I. is built in two halves, the roots attaching to inverted V-struts from the fuselage, and the lift struts meeting the spars nearly half-way out to the tips. It might appear that this point is rather far outwards, but, on the other hand, probably the designer had in mind torsional stiffness rather than the direct bending stresses, which, after all, are fairly easy to take care of. There is little doubt that the breakage of the wings of the Dornier "Falke" at Madrid recently was the result of insufficient stiffness against torsion, as the wings are stated to have been seen by competent observers to "flutter" before they finally broke. The two tubes seen in the front elevation of the Wibault are not part of the wing structure, being aileron control tubes used to avoid the use of cables in the aileron control system. The wing spars are of the Duralumin box type, and the ribs are built up of Duralumin tubes, assembled by small Duralumin fittings pressed from the sheet. The ailerons, it will be seen, are very long, and of high aspect ratio.

No particulars are available relating to the fuselage construction beyond the fact that it is all-metal, with the exception of the covering. Even this is aluminium over the front portion, up to the cockpit. The 300 h.p. Hispano-Suiza engine is entirely cowled-in, and is equipped with a Rateau supercharger, which enables full power to be maintained up to an altitude of 15,000 ft. A Lamblin radiator is mounted on each side of the fuselage.

The undercarriage is usual type, but the arrangement of the rubber shock absorbers is such as to enable these to be removed without dismantling the axle.

The main characteristics of the Wibault 3 C.I. are as follows:—Span, 38 ft. 7 ins. Length o.a., 26 ft. 7 ins. Chord, 7 ft. 5 ins. Wing area, 285 sq. ft. Weight of machine empty, 2,100 lbs. Weight of fuel, 500 lbs. Useful load, 485 lbs. Total loaded weight, 3,085 lbs. Wing loading, 10·8 lbs./sq. ft. Power loading, 10·3 lbs./h.p. Speed at 6,500 ft., 152 m.p.h. Speed at 16,500 ft., 174 m.p.h. Ceiling, 34,500 ft. Range at 16,500 ft., 530 miles. Landing speed, 50 m.p.h.

HONOURS

THE King has approved of the following rewards for distinguished service in the Field with the Waziristan Force:—

Distinguished Service Order

Major Arthur E. B. Parsons, O.B.E., 2nd Bn., 12th Frontier Force Regt., I.A.

As Political Officer he volunteered to fly as a passenger with the Royal Air Force Squadrons in bombing operations against the hostile Mahsuds, whose location in difficult country it was hardly possible to find except under his personal guidance. This he has done on several occasions with complete success, and has shown conspicuous daring and initiative in finding the targets. While guiding the raid on the Jelal Khel on December 24, 1922, he was severely wounded in the arm while flying at a low altitude.

His gallantry has been of the greatest value to the Royal Air Force in enabling them to find and deal with their objective.

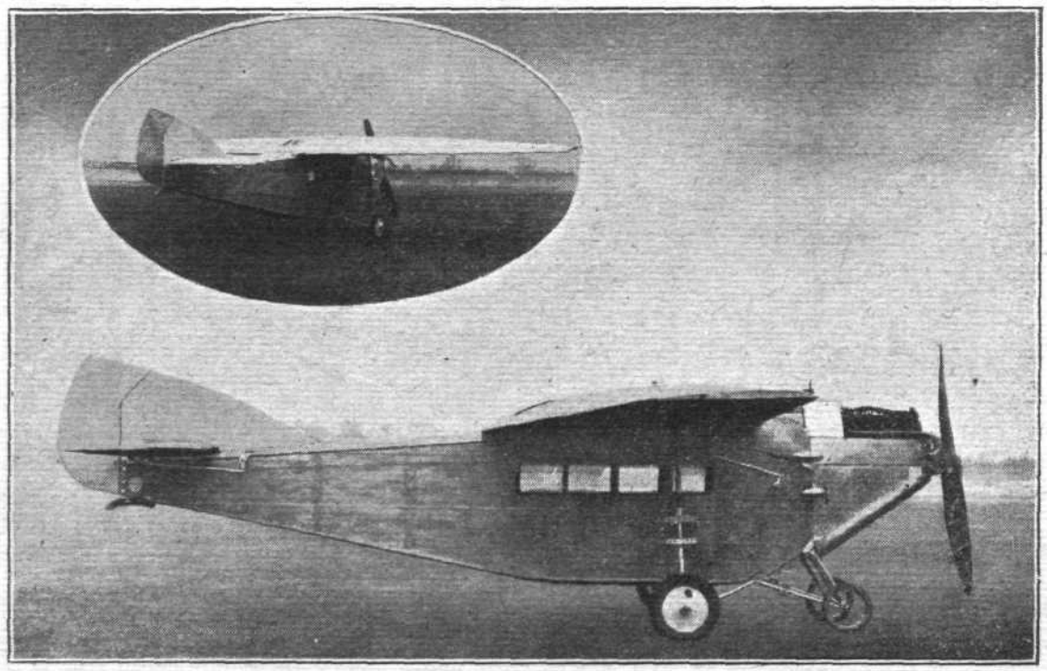
Military Cross

Lieut. A. Hancock, 9th Jat. Regt., I.A.

Near Katkai, on December 18, 1922, when a mixed column had moved out to co-operate with the Royal Air Force, he displayed conspicuous bravery, coolness, and judgment under fire, when with three platoons of his company he seized and held a hill in advance of the main position. He was under close enfilade fire from the enemy the whole time. His senior Indian officer had been killed and fourteen other ranks wounded during the three hours he held the hill.

During the whole time, by his coolness and judgment he set a splendid example to his men. Finally, when ordered to retire, still under very accurate fire, he removed the remainder of the wounded and all Lewis guns and arms.

The Handasyde H.2 Commercial Monoplane: This machine, a full description of which was published in our issue of July 20, 1922, has been undergoing tests recently at Brooklands. It is intended for service in Australia, and is fitted with a Rolls-Royce "Eagle" engine.



FLIGHT
AIRCRAFT ENGINEER AND AIRSHIP

LIGHT 'PLANE AND GLIDER NOTES

Those wishing to get in touch with others interested in matters relating to gliding and the construction of gliders are invited to write to the Editor of FLIGHT, *who will be pleased to publish such communications on this page, in order to bring together those who would like to co-operate, either in forming gliding clubs or in private collaboration.*

ON Saturday of last week the Gnosspelius light 'plane, described elsewhere in this issue, was put through its preliminary flying tests at Lympne aerodrome, whither it had been transported by motor lorry. Less than two hours after its arrival the machine was in the air, piloted by Mr. Parker, Short Brothers' test pilot. During the first flight a height of about 1,500 ft. was reached, the machine climbing strongly. The duration of this flight was about 15 mins. A landing was then made, and a little later another flight was undertaken the machine on this occasion reaching a height of 2,500 ft., and remaining up for approximately half an hour. The climb was quite strong, and the maximum horizontal speed attained, as shown by the air-speed indicator, was about 65 m.p.h.

* * *

WE understand that certain minor adjustments are required, but that is inevitable in any new machine, and certainly Major Gnosspelius is to be congratulated on having produced a machine which, although of quite new type, flew so well the first time of asking. The airscrews fitted are such as to keep down the engine revolutions to about 2,500, so that when "all-out" the Blackburne engine cannot develop more than about 16 h.p., although when allowed to "rev." up to 4,500 r.p.m. it will develop about 24 h.p. By thus keeping the revolutions down the reliability of the engine should be assured, and the climb was such that, even with the engine held down to 16 h.p., the amount of power in reserve must be considerably more than 50 per cent., which is better than obtained on the majority of commercial aeroplanes.

* * *

FROM the "power-required" curve, very kindly shown us by Major Gnosspelius, it appears that the minimum thrust horse-power is about 3. Assuming that at this speed the airscrew efficiency is about 70 per cent. it means that the minimum power to be given by the engine is about 4·3 b.h.p. Even if we assume it to be 5 b.h.p., the power reserve is 11 h.p. As the weight is about 530 lbs. the climb should be, assuming 75 per cent. efficiency, about 480 ft. per minute. As the best climb would probably occur in the neighbourhood of 40 m.p.h., the climbing angle should be somewhere in the neighbourhood of 1 in 8, which is very good. Altogether the Gnosspelius light 'plane should prove something more than a machine for cruising around in the neighbourhood of aerodromes, and should be well capable of cross-country work. That nothing of the kind was attempted on Saturday last was, of course, due to the fact that the machine is experimental, and has not yet been given her registration letters. Would it, we wonder, be possible to take a leaf out of the book of the French Nieuport firm, who got, for one of their racers flown by Lecointe, the registration letters F-SADI, and give the Gnosspelius machine the letters G-NOSS ?

* * *

INCIDENTALLY, it is of interest to note that the Blackburne engine, which is of 697 c.c. capacity, ran excellently during the tests, and gave very little vibration. This is encouraging, as there had been a certain amount of doubt as to how the V-twin engine would behave when mounted in such a relatively flexible structure as an aeroplane. It appears, if the Blackburne can be regarded as an average V-twin, that no fears need be entertained on that score, which fact considerably widens the choice of engine for a light 'plane. There are, however, probably few V-twin engines which are as light, for their power as the Blackburne, especially in sizes below the 750 c.c. stipulated for the competitions, and we would recommend designers of light 'planes who are as yet undecided what engine to choose to give the Blackburne due consideration.

* * *

WHILE we in this country are contemplating what can be done with existing motor-cycle and light-car engines, French designers are already looking ahead, and at a meeting called by the French Aerial Association recently the subject was "What are the Desiderata of the Light 'Plane Engine?" At present opinions are very much divided on this point, and naturally so, since we do not know yet even what power is likely to be necessary. At the meeting one constructor called for an engine of 4 h.p., while M. Louis de Monge, the well-known designer, thought an engine of about 44 h.p. was required for cross-country touring on single seaters, or, alternatively, a 70 h.p. engine for two-seaters. Personally we do not agree with either view, but there is so much room for discussion that we think the attitude adopted in this country, of finding out first of all what we can do with existing cycle engines, is the better. Later on we can always look into the matter of special engines. If we can do all that is required with existing engines, which are cheap and for which spares are easily obtainable, so much the better.

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NINE entries have been received, up to the present, for the glider week to be held at Vauville, near Cherbourg, from August 5 to 26. These are: (1) Eric Nessler; (2) Jean Galland; (3) Société l' "Icare"; (4) Charles Marais; (5) Henry Grandin; (6) J. Pimoule; (7) V. Simonet; (8) Louis Breguet; (9) S.A.B.C.A. The machine entered by Breguet is a "Colibri," and will be fitted with a 10 h.p. engine. The machine is expected to weigh 110 kgs. empty, and will have 15 sq. m. (162 sq. ft.) of surface. The span is 33 ft. 7 ins. and the length 20 ft. 4 ins. Assuming a weight of 150 lbs. for the pilot, the loaded weight should be about 600 lbs., giving a wing loading of about 3¾ lbs./sq. ft., which seems somewhat heavy.

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THE machine entered by the Société Anonyme Belge de Constructions Aéronautiques is a thick-wing monoplane designed by Jullien. It has a span of 44 ft., a length of 16 ft. 5 ins., and an area of 20 sq. m. (216 sq. ft.). The weight empty is given as 170 kgs. (375 lbs.), and the machine will be fitted with an engine of 10 h.p.

* * *

As the meeting at Vauville is open to British competitors, a few explanatory notes may be of interest. The meeting of Vauville is being organised by the French Aerial Association, under the patronage of the Secretary of State for Air. It is not a competition in the usual sense of the word, but rather a series of more or less scientific experiments, the prizes offered being more intended to reimburse in some measure the participants. The entrance fee is 50 francs per machine up to May 31, and 100 francs between June 1 and the closing date, July 1. Entries should be sent to the Secretariat Général de l'Association Française Aérienne, 17, Boulevard des Batignolles, Paris (8e).

* * *

MACHINES fitted with engines may take part in the pure glider competitions, but must either have their engines removed before any flight of this kind, or prove before starting that the engine has been effectively prevented from being used during such flights.

* * *

PRIZES amounting to 10,000 francs (Prix de la Ville de Cherbourg) will be awarded for longest duration in the air. A similar amount (Prix de Conseil Général de la Manche) will be awarded for the longest aggregate duration in the air during the meeting.

* * *

ANOTHER 10,000 francs will be awarded for greatest height attained above starting point (Prix Louis Breguet, 5,000 francs; Prix Mouillard, 3,000 francs; and Prix A. de la Hault, 2,000 francs).

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DISTANCE flights will be awarded 15,000 francs, the donors being: Réné Quinton, 5,000; Charles Renard, 4,000; Capitaine Ferber, 3,000; Marey, 1,500; Charles Weismann, 1,000; and Jules Frateur, 500 francs.

* * *

DISTANCE flights for gliders with auxiliary engines will be awarded a total of 16,000 francs (donors: Commerce de Cherbourg, Adrien Fetu, and André Carlier). The engines are to be regarded as auxiliary, and mainly intended to enable machines to bridge gaps between two ranges of hills. The maximum fuel allowed is limited to 500 c.c., and the minimum distance to be covered is 6 kilometres (about 4 miles).

* * *

SEVERAL minor competitions are to be held, such as for flying gliders of a school type, while one or two have not been decided upon. The total amount of prizes is 100,000 francs (about £1,670 at present rate of exchange), and, quite apart from the possibility of winning prizes, a good deal of interest might be learnt by paying a visit to Vauville. The auxiliary engined glider is rather different in scope from the machines that will take part in the British light 'plane competitions, but nevertheless, should provide useful information for the latter, which will follow about a month later.

THE GNOSSPELIUS LIGHT 'PLANE

700 C.C. Blackburne Engine

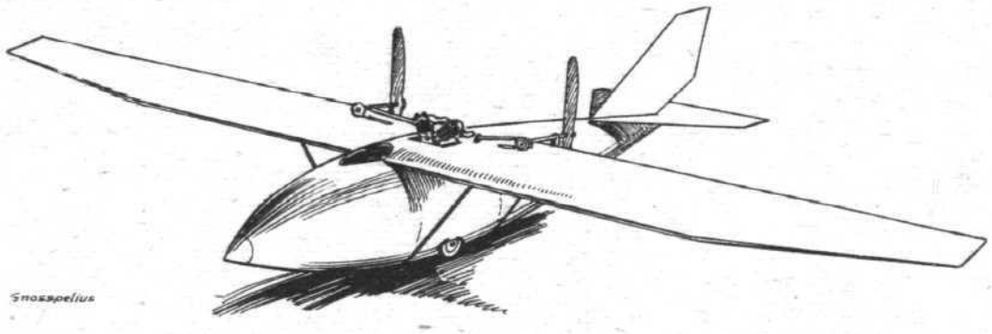
AERODYNAMIC efficiency is the keynote of the light 'plane which Major O. T. Gnosspelius has designed, and which was recently finished at the Rochester works of Short Brothers. The new machine, as distinct from the majority of ordinary aeroplanes, was designed from the aerodynamic point of view entirely, and, having got the efficiency as good as seemed possible without a great deal of further experiment, the designer set to work to see how the shapes which he had found by experiment to be good could be translated into a sound aeroplane structure. This is not to be taken to mean that the construction is in any way inferior, but merely that where, as frequently happens, aerodynamic and structural requirements clashed, the former were given preference. Perhaps an illustration may help to explain what we are driving at. Had Major Gnosspelius given preference to structural considerations he would undoubtedly have chosen a much thicker wing section, and trusted to luck to get the best possible aerodynamic results from it. Instead he discovered a wing section which, although deeply cambered, was not very thick, but which gave good results. He chose this section deliberately, fully realising that in so doing he was setting himself a considerable structural problem. How he solved that will be related in its proper place, but the example given shows that this designer, at any rate, is not content to take the line of least resistance (if a "pun" may be allowed, that is, of course, exactly what he has done) and hoping for the best.

In view of this somewhat unusual line of attack, a few words concerning the starting point may not be without interest. In a paper read before the Institution of Aeronautical Engineers (published in FLIGHT of December 21, 1922), entitled "Experimental Data Without a Wind Tunnel," Major Gnosspelius described the pendulum apparatus which he and other members of Short's designing staff developed for purposes of testing scale models of wings or of complete machines. On this pendulum the models are mounted, with the wings parallel to the pendulum arm, and the tests are carried out by raising the pendulum to a horizontal position, releasing it from there and noting how far it swings up on the other side of "dead centre." This gives an indication of the resistance of the model, while the lateral deflection of the pendulum at its lowest position gives an indication of the lift.

On this pendulum Major Gnosspelius has tested a large number of models, and he has discovered several very interesting, and to some extent inexplicable, things. First of all he tested certain wing sections of which data were already available. He found that reasonably good agreement was obtained. He then tested other wing sections, as, for instance, the R.A.F. 19, which was found by model tests at the N.P.L. to give a very high lift. On the pendulum this high lift was not attained. Now the curious fact about this test is that when tested on the full scale R.A.F. 19 does not give the high lift which wind tunnel tests on models indicated. The logical conclusion seems to be that the pendulum, in certain circumstances, is in better agreement with full scale work than is the wind tunnel. A good deal more evidence is necessary before one can definitely say that this is so, but several experiments seem to point that way. If this should prove to be so, the fact may considerably alter our views on aerodynamics, and it even seems possible that the phenomenon commonly known as "scale effect" does not exist, and that the differences between model and full scale results, as indicated by wind tunnel tests, may be due to other causes, possibly to the effect of the walls of the wind tunnel. That, we believe, is the theory of Major Gnosspelius, and it should be possible—at relatively trifling cost—to discover whether or not that is the explanation. For instance, one way of deciding would appear to be to test a small model in the large "Duplex" tunnel at Teddington, where the model would be well removed from the walls.

However, we are rather wandering away from our subject, but our excuse must be that this problem is really one of very considerable importance, and that if the pendulum is indeed superior to the tunnel in certain respects, then that is all the more reason why every aircraft firm, and, in fact, hundreds of people interested in aerodynamics, could commence experiments at trifling initial cost and with no running expenses other than those involved in making the models. If that should prove feasible, progress ought to be rapid, and instead of research being confined to a few very costly establishments it would be made generally available, which fact could scarcely fail to be of the very greatest benefit to the future development of aviation, even if it is granted that the utility is restricted to lift and drag measurements, and that pressure plotting is difficult and determination of c.p. position and of rotary derivatives impossible.

To return to the Gnosspelius light 'plane, many forms of wings and bodies, and combinations thereof, were tested, and led to some surprising results. So did also some tests on different tails on certain combinations. If, therefore, the Gnosspelius light 'plane shows some unusual features one should be very wary of expressing an opinion on their merits, as there is very good reason for everything that has been done. It is probably not betraying a secret if we state that an L/D of over 16 for the whole machine was indicated by the model tests on the pendulum. Practical experiment with the full-size machine will alone indicate whether or not this figure is correct, but in view of the very accurate prediction obtained from a model of a large machine of more orthodox design, it appears reasonable to expect that this figure does, in fact, represent full-scale conditions. The maximum lift of the complete model corresponded, we believe, to an "absolute" lift coefficient of over 0·6.



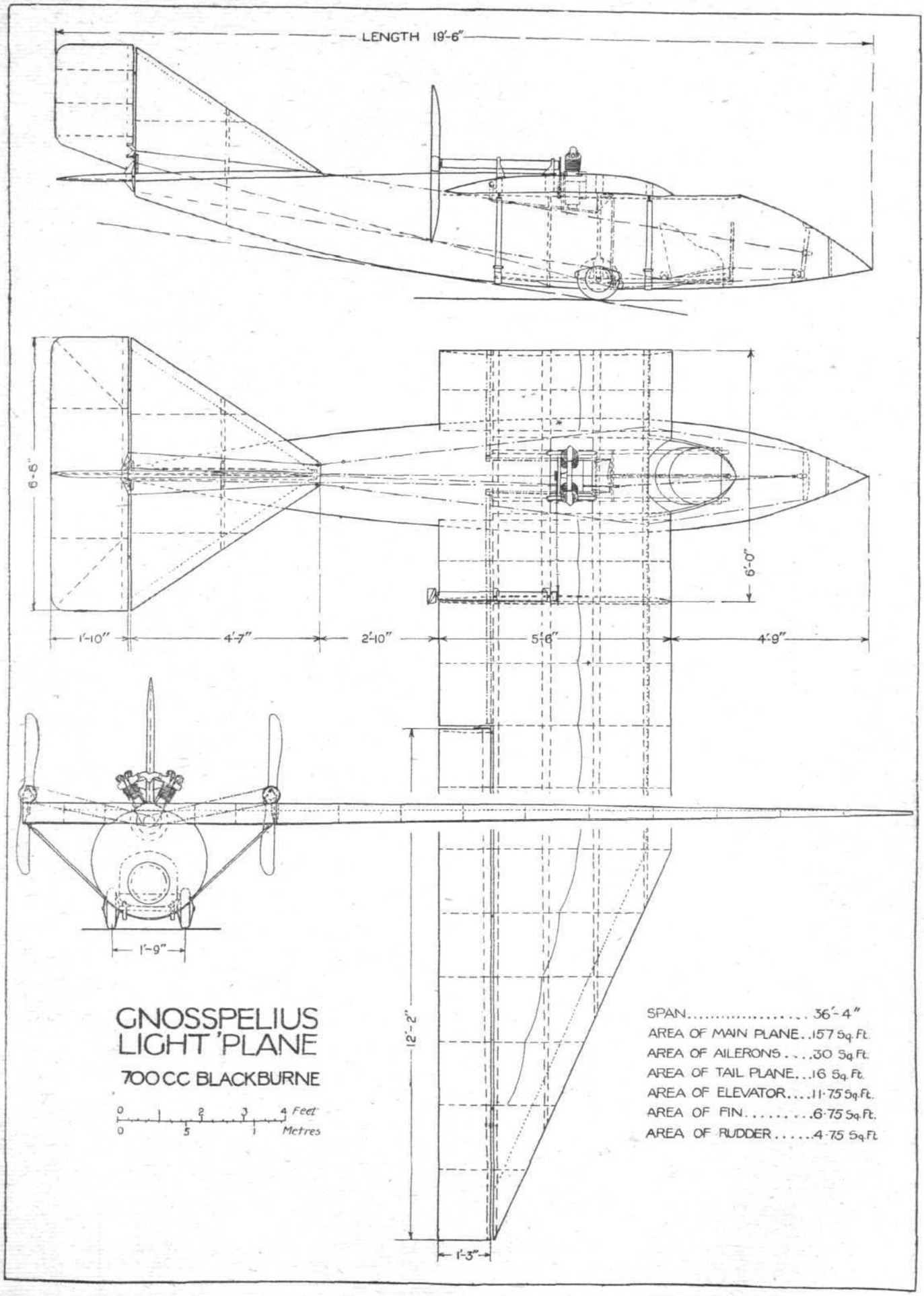
The Gnosspelius light 'plane: Three-quarter front view.

Turning to the general arrangement drawings on p. 293, it will be seen that the Gnosspelius light 'plane has considerable resemblance to a bird in so far as the shape of the wings, body, and tail are concerned. The body, which is of circular cross-section, comes to a point in the nose, and this point, be it noted, is not on the centre line, but is slightly bent down, much as is the head of a bird during flight. We have not the slightest idea whether or not this position has any effect on the resistance. The wing is composed of a parallel central portion with triangular end pieces, or nearly so, the chord of the aileron preventing the entire wing tip from coming quite to a point.

The tail plane is long in relation to its span, and is of triangular plan form. A one-piece elevator is hinged to its trailing edge, and, but for the thinning down of the sloping edges of the tail plane, this is of flat section. The rudder, which is mounted wholly above the tail, is hinged to a triangular fin. The ailerons are of considerable size, each being over 12 ft. long, and of high aspect ratio. Of exposed undercarriage there is practically none, the only projections being less than one-half of two small Palmer wheels.

Having indicated the main aerodynamical features of the design, we may turn to the constructional side. The body is a streamline structure, built very much like a boat, with "hoops" or frames of rock elm and a planking of spruce

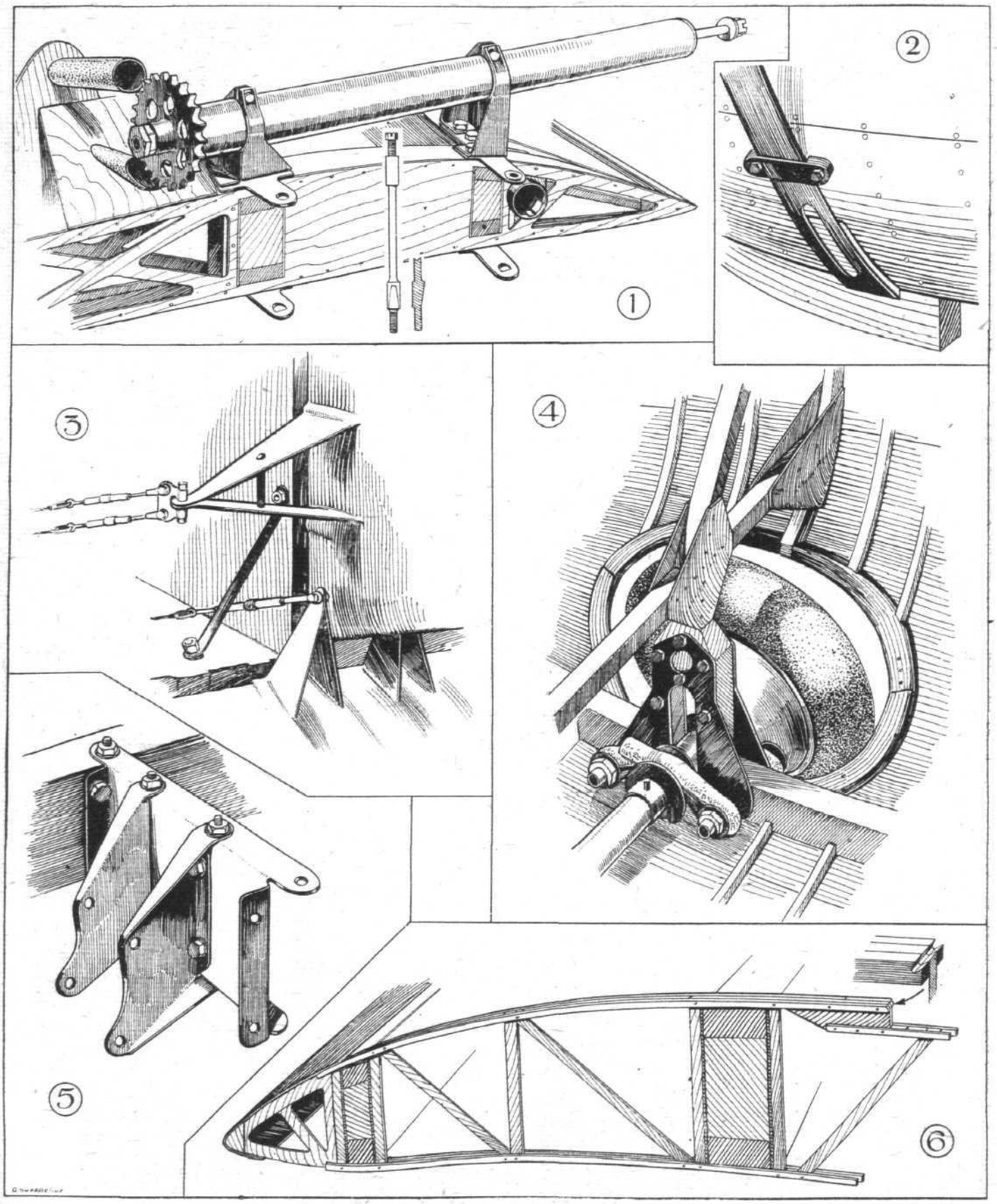
FLIGHT



THE GNOSSPELIUS LIGHT 'PLANE : General arrangement drawings, to scale.

about $\frac{1}{10}$ in. thick. Here and there, where local considerations demand, this main structure is reinforced by extra members. For instance, in the neighbourhood of the cockpit, and under the points of attachment of the wing spars, light spruce frames, forming rectangles inside the circular section, are used for transmitting localised stresses over a larger area, and stout longitudinal members, two inside and two outside, bolted through, serve as supports for the undercarriage and—in the case of the outer ones—as skids when the rubbers stretch sufficiently to let the body itself touch the ground. There is no tail skid, but a sort of keel runs along a portion of the bottom, and on the outside is a metal rubbing strip protecting the planking. The two wheels project through holes cut in the planking, and rather less than half of their diameter is exposed.

The pilot is placed forward of the wing, with his head and



SOME CONSTRUCTIONAL DETAILS OF THE GNOSSPELIUS LIGHT 'PLANE : 1. Mounting of one of the propeller shafts. The shafts are mounted eccentrically in their tubes, thus providing chain adjustment. Note the taper bolt securing wings to centre-section. 2. The lift struts are flattened out and passed under the fuselage. 3. The rudder and elevator cranks are of sheet steel. Note the short tubular strut which braces the fin to the tail plane spar. 4. The wheels of the undercarriage are partly enclosed in the fuselage, a portion of them projecting through an opening cut in the planking. 5. One side of the very simple Duralumin engine bearer, which allows of easy removal of the engine from the centre-section. 6. A typical rib, showing how the " step " is formed.

shoulders occupying a space cut out in the leading edge. Thus his view is to all intents and purposes unrestricted in any direction that matters, while the fact that the machine is a twin-screw "pusher" relieves him of any slipstream. The only thing that might detract from his perfect happiness is the thought that the engine—not a very big one, it is true—is above and behind him. The controls are of usual type, and do not appear to call for special comment.

Mention has already been made of the fact that the wing section employed is of fairly deep camber, although not of great thickness. One result of this is that it would have been almost impossible to obtain sufficient torsional stiffness with the usual two-spar construction. Consequently Major Gnosspelius decided to employ four spars, and so to design his ribs that any deflection of any one spar should be transmitted to the other three. The spars themselves are of the box type, with spruce flanges and three-ply walls. The ribs are of lattice construction, with double flange strips, in between which are passed the ends of the lattice bars, tacked and glued in place. To be quite accurate, it should, perhaps, be said that the ribs are N-girders rather than lattices, as the compression members are vertical. However, the form should be evident from our sketches.

Apart from its unusual plan form and deep lower camber, the wing section employed in the Gnosspelius light 'plane is of interest in having on the upper surface, coincident with the maximum ordinate, a small step, not unlike the step of a flying boat. The precise aerodynamic action of this step, which runs the whole span of the wing, is not known, but it has been found to increase the efficiency considerably. Whether or not it acts in a manner somewhat similar to the Howard Wright double aerofoil we cannot say, but from the fact that the latter consists of two curves, while the former is a rectangular step, it would appear that, although increased efficiency is the result in both cases, the manner of obtaining it is different. The very fact that any effect at all is noticeable is of interest, and goes to show that there may still be surprises in store for us in the matter of wing sections.

The wing is built up of three sections, a centre section of about 6 ft. span, and two end sections. The joints in the spars are made by fish-plates and long vertical bolts. The latter are of special shape, and incorporate a flat taper at their lower end in order to provide means for drawing together the two spar ends. The shape of these bolts is shown in one of our sketches. For transport along a road, or for storage in a small shed, the end sections can thus be removed by undoing eight bolts. As the ailerons are operated by long tubes having dog clutches incorporated at the joint in the wing, removal of the end sections does not necessitate interfering with the aileron controls. When replacing the end sections of the wing it is, of course, necessary to see that the control-stick is central and the ailerons flush with the rest of the wing. The dog clutches will then engage, and when the wing is bolted up the two tubes cannot slide apart.

Attachment of the centre section to the fuselage is by means of eight long U-bolts, which are dropped down over the spars, and whose ends are passed through holes in the gunwales on the body and secured there by nuts. Owing partly to the relatively small width between gunwales, and partly to the thin wing section employed, it has not been found advisable to make the wing a pure cantilever. The external bracing has, however, been reduced to two struts on each side. As the function of these struts is mainly to help the wing in resisting torsion, they are attached to front and rear spars respectively, the second and third spars transmitting their load *via* the ribs at this point. The manner of forming these lift struts and their attachments is interesting. Instead of the struts running to heavy fittings on the body, they run right across underneath the "keel," being flattened for the whole distance over which they are in contact with the planking. In order to lighten them they have had pieces cut out over this portion, only the two edges of the flattened tubes being left. The very light fitting locating the tubes on the planking is shown in a sketch.

The 700 c.c. Blackburne engine is mounted in the centre-section of the wing. This position has been chosen for several reasons. To begin with, it is, we believe, intended to use the machine both as a glider and as a light 'plane. In order that this might be possible it was necessary so to place the pilot and engine that the machine would trim correctly whether the engine was on board or not. Consequently the pilot was placed ahead of the wing, in which position he balances the rest of the machine, while putting the engine in the centre-section merely adds weight, but does not cause the total centre of gravity to shift. The engine being air-cooled, it was not possible to place it inside the body, and, although it is thought possible that the projecting cylinders on the centre-section may have a certain amount of adverse effect on the flow of air over the wing, it was decided to try the experiment.

Two pusher airscrews are placed out on the wings, and are driven by two chains, a certain amount of reduction (about 2/3) being used. Each propeller is mounted on a shaft, which is in turn carried in ball bearings in the ends of a large-diameter tube, as shown in a sketch. The ball bearings are mounted excentrically in the ends of the tube, so that chain adjustment may be effected by simply twisting the tubular casing around the propeller shafts. The tubes themselves are carried in simple fittings on top of the wing spars, the details being indicated in the sketch. Where the chains pass inside the wing they are enclosed in fibre tube guards.

As already mentioned, the tail is wholly above the top of the body, and forms a unit attached by U-bolts and flat straps to the boat structure. The elevator and rudder king-posts are simple sheet steel fittings, and the fin post is slightly braced by short tubular struts to the tail plane spar. Constructionally the tail is similar to the wing. All control cables pass inside the fuselage, and as there is no transverse bracing they are easily visible for their whole length, as well as reasonably easy to get at for repairs.

The wheel track is narrow, about 1 ft. 9 ins., but even if the machine should lean over until a wing tip touched, the propellers would still be well clear of the ground. It is becoming increasingly evident that on this type of machine a narrow track is quite satisfactory, and, as a matter of fact, the wheels are probably really only required for taking-off. It seems probable that it might be quite feasible to land on the belly of the fuselage, as the machine would have come practically to a standstill before a wing tip touched.

With reference to performance, etc., it is expected that the Gnosspelius light 'plane will weigh about 530 lbs., which figure includes petrol for about two hours' flying. As the wing area is 157 sq. ft., the wing loading will be approximately 3·4 lbs./sq. ft., and the landing speed approximately 30 m.p.h. A maximum speed of about 70 m.p.h. will probably be attained, and a very economical cruising speed of about 45 m.p.h., when the mileage per gallon of fuel should be very good indeed. From the model tests it appears that the minimum power required for horizontal flight is in the neighbourhood of 3 b.h.p. The climb should be good, probably between 400 and 500 ft./min., and as the speed at which the best climb occurs is low, the climbing *angle* should be excellent.

The machine is fitted with specially light glider instruments of Smith manufacture, such as air speed indicator reading from 10 to 80 m.p.h, revolution indicator, aneriod, and oil-pressure gauges.

To the Labrador Goldfields by Air

F. SIDNEY COTTON, who is no doubt well known to most of our readers, has, apparently, been experiencing exciting times in connection with an aerial expedition which he has just successfully led from Newfoundland to the newly-discovered goldfields at Labrador, and back again to their base at Botwood, Newfoundland. We hope to give details of this expedition later, and will only record here that the purpose of this venture, which has been organised by the Aerial Survey Co. (Nfld.), Ltd., was to make an aerial map of all the area on which claims have been staked, to leave a survey party on the goldfields to prepare for the arrival of the prospectors, and to bring back samples.

Major Cotton arrived back safely at Botwood on Wednesday, the 16th inst.

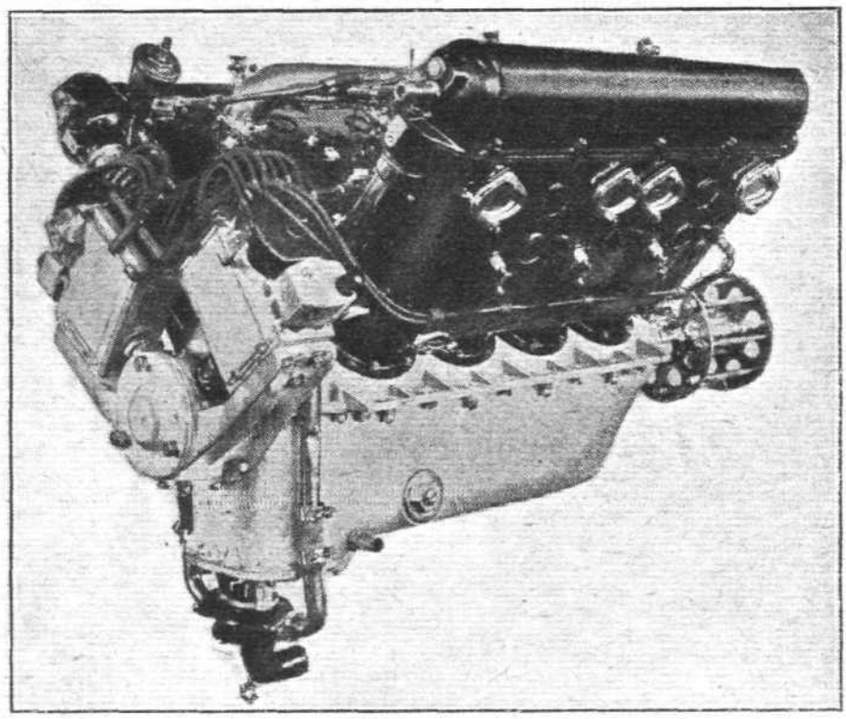
And Then There Was One.

L'ESCADRILLE BAPT, which set out some weeks ago with the intention of touring the world by aeroplane, appears to have been dogged by ill-luck. From the very start things went wrong, and it took the squadron a long time to get as far as Italy. At the various meetings the squadron was met by Italian pilots, who accompanied it (sometimes) from one stopping place to another. After many delays the three machines (Gordou-Leseurre monoplanes) got as far as Palermo, but in attempting the flight from Sicily to Tunis Madon and Picard had engine trouble, and had to land on the steep slopes of a mountain on the island of Pantelleria. Madon crashed, but escaped with a shaking. Picard, however, went through a bank of fog, and was rather badly hurt in collision with the mountain-side.

THE WRIGHT E.4 AERO ENGINES

DURING the war the Wright Aeronautical Corporation of Paterson, New Jersey, U.S.A., contributed towards the increasing demand for aircraft material by building Hispano-Suiza aero engines. Since then they have been developing this type of engine, and as a result have at one time or another produced various models of Hispano-type engines, under the name of Wright, which possessed certain modifications and departures from the original Hispano.

The most recent of these engines to be produced by the Wright Company is the E.4, and one of these engines has just successfully passed the U.S. Government 300-hour endurance test. The E.4 varies in several respects from previous Wright models, as well as from the Hispano. As far as outward appearance goes, the principal change consists of the indentation of the water jackets between the cylinders, for the purpose of cutting down water weight. The previous models used typical Hispano cylinder construction, with screwed-in sleeves. The E.4, however, has open head sleeves, somewhat like the Siddeley "Puma," and the sleeve is screwed into the cylinder water jacket at the top only. This operation is performed with the cylinder block at a fairly high temperature, and the cylinder sleeve cool, so that there is a shrink fit.



The Wright E.4 Aero Engine.

The cylinder head itself is aluminium, of a thickness sufficient to withstand explosion pressure.

The valve seats are of aluminium bronze, held in position not by spinning but by a shrink fit. It is this change in construction which, it is claimed, has been the means of making this engine capable of the very long periods of running without overhaul. Another change in the E.4 is the fitting of a new Stromberg carburettor, which has the float chamber between the dual venturis. The position of the float bowl prevents flooding when climbing, diving, and "catapulting."

Minor changes in the Wright engines, not incorporated in the Hispano-Suiza, consist of a modified lower half of the crank-case and oil pump—giving a shallower case and a true dry sump—and the employment of marine-type connecting rods and a special bearing metal known as "Kelmet"—a high lead bronze.

Turning now to the 300-hour endurance test. During the past year Lieut. B. G. Leighton, of the U.S. Bureau of Aeronautics, Navy Department, has been working steadily to bring about improvements in engines, in order to provide greater durability and reliability. During the War duration tests were conducted over periods of 50 hours of running. It was a mark of distinction to pass such a test successfully, although the engines were not run at full throttle; the run was broken into five separate periods of 10 hours each, and all ordinary adjustments and replacements of minor parts were permitted. Improvements made to post-War types convinced Lieut. Leighton that a longer period of test than 50 hours was required to measure the life of new engine types. Accordingly specifications were drawn for an endurance test of 300 hours, although the engines were only required to develop about six-tenths of their rated h.p. As certain types of engines successfully met this test, new specifications were arranged, requiring engines to operate at full rated h.p. and to use standard aviation fuel.

Some time ago a Wright E.2 engine was submitted to this latter test. The test was conducted at Anacostia, under the direct supervision of the Bureau of Aeronautics. It was found that the E.2 performed very well up to 125 hours, but at the conclusion of that period of running the valves, and valve seats particularly, and the pistons were in bad condition, requiring replacement before continuing the test. In connection with the life of the E.2 engine at full throttle, it is interesting to note a statement recently given out by Lieut. Leighton in a paper read before the Washington Section of the Society of Automotive Engineers. The fact is brought out in this paper that the Liberty engine, which is a war development, and by many still considered to be the standard of durability, has an average life of 72 hours between overhauls in actual Navy service, while the Wright E.2 engine has an average life in actual service of 101 hours between overhauls, and under substantially the same service conditions. It is, therefore, apparent that, while the E.2 was not capable of successfully meeting Lieut. Leighton's full throttle endurance test, it, nevertheless, showed remarkable improvement over War-time standards of reliability.

Meanwhile, the Wright Company was developing the new type of cylinder design previously referred to. This design was first worked out on their 12-cylinder 600 h.p. type, known as "T.2," and incorporated in that type. With Lieut. Leighton's permission, it was determined to construct a pair of cylinder blocks of this new type, and again make an effort to meet successfully the Navy's full throttle endurance test. This type of engine, which is in current production, is known as type E.4, and is the very latest Wright development in the 200 h.p. size. In order to measure the length of life of certain of the major parts of the engine, the new type of E.4 cylinder blocks were mounted upon the same engine which had previously run 250 hours of full throttle on the E.2 test. No changes were made in the engine, except the replacement of the E.2 cylinder blocks with the E.4 type. This E.4 engine has just completed a successful 300-hour full throttle test. Certain press dispatches in connection with the completion of this test erroneously stated that the E.4 engine had been operated continuously for a period in excess of 500 hours. As a matter of fact, not even the last 300 hours of running were continuous. No involuntary stops were made during this latter period, but several voluntary stops were made, principally to change clubs, as the engine was operated on a torque stand with the clubs exposed to the weather. Moreover, the early part of this test incorporated certain tests of lubricating oils, and one or two stops were made for the purpose of changing oils. However, the engine did operate throughout the 300-hour period without failure of any part, either major or minor, and the valves and pistons were in almost perfect condition at the conclusion. In fact, the engine was pulling a trifle more horse-power at the conclusion than at the beginning of the test. Throughout the run it averaged approximately 205 h.p.

Disassembly of the engine and inspection disclosed the fact that a ball-bearing retainer ring had broken away, and, very probably due to this, one of the crank-case studs was broken. Neither of these damaged parts, however, interfered with the running of the engine or with its ability to develop its maximum power at the finish.

In the past the limiting features of long durability at full throttle have been, primarily, valves, pistons and connecting-

rod bearings. In the E.4 type of cylinder construction, it seems that the Wright Company have set up an entirely new standard for these parts. The Wright engineers believe that much of this success is due to the new silchrome tulip valves and the new type of bronze valve seats, and, in the case of bearings, to the use of Kelmet.

Of utmost interest to service possibilities of the E.4 engine is its comparison to its predecessor, the E.2. Under full throttle endurance test the life of the E.2 was apparently 125 hours, as against 300 hours or more for the E.4 under the same conditions. It is a fact that in actual service the E.2 may be operated for at least 100 hours between overhauls, which, of course, indicates a much better service life for the E.4. The superiority of these improvements for the training plane engine or for commercial projects, as compared with other types, is obvious, as it seems reasonable to believe that the life of the basic parts of the E.4 is likely to be more than that of the plane in which it is mounted.

THE FRENCH "MANCHE À BALAI" ACTION

British Constructors Next?

As briefly announced in FLIGHT last week, the French courts have awarded M. Robert Esnault-Pelterie 7,500,000 francs on his "Joy-stick" patents, the French State to pay rather more than half of this amount, and the well-known firms of Farman, Caudron, and Breguet to pay the balance. As it appears that several British aircraft firms have had writs served on them for amounts claimed on machines that were sent to France during the War, we have considered it of interest to quote the following extracts from an article published in FLIGHT on August 12, 1920, dealing with the proceedings that had then been taken, and of which the recent judgment is the final outcome :—

"Several firms seemed to have obtained licences from M. Pelterie, but as others consistently ignored the patent, M. Pelterie in 1912 commenced an action against them. Legal process in France, especially when it relates to patents, is dilatory, to say the least, but by March 28, 1914, the Paris Courts had ordered an enquiry to be made by experts as to the validity of the patents in question. By an order of March 8, 1919, the Court pronounced the patent valid, and ordered the infringing firms to pay damages, the amount of these damages to be determined by a committee of experts. This committee has apparently decided that the royalty should be 2,000 francs per machine.

"In the meantime, M. Pelterie has secured an injunction preventing the French Government paying over to the constructors certain moneys which are due to the latter until the case is settled. It is stated that the State owes in this way between 9 and 10 million francs, while the amount claimed by M. Pelterie totals to about 65,000,000 francs. According to one account, the amounts claimed from various firms include : Spad, 20 million francs ; Nieuport, 16 millions ; Breguet, 16 millions ; Caudron, 8 millions ; Morane-Saulnier, 5 millions ; Henri Farman, 1 million, etc.

"On July 29 the Court granted a decree for payment of royalty at the rate of 2,000 francs per machine against the Letord and Niepce firm, and on July 31 a similar order was made against M. Louis Breguet. The matter was argued at length in the Court on August 7 in an action against MM. Robert Morane and Borel, when, however, judgment was deferred for eight days. Just previous to this case being heard, a similar action against Messrs. Vickers was heard. M. Pelterie's counsel sought to garnishee a sum of 1,500,000 francs owing by the French Government to Messrs. Vickers, but after hearing arguments the President of the Court reduced the amount to be earmarked to 800,000 francs, and ordered it to be paid into Court in the form of *Bons de la Défense Nationale*.

"Feeling is running very high in France in connection with these actions, and at the hearing on Monday of an appeal by M. Breguet against the decision of July 31, M. Breguet was ordered to leave the Court. An action against the Caudron firm was down for hearing on Tuesday.

"So far the question has centred round the French patent. From the hurried search among the British patent records, which has been possible in the brief period available, it appears that of the seventeen English patents granted to M. Robert A. C. Esnault-Pelterie, the following relate to control :—

1907.
28034, December 19. French patent same date previous year.

1908.
221, January 3. French date, January 19, 1907.
1258, January 18. French date, January 29, 1907.
10528, May 14. French date, May 22, 1907.
28026, 28027, 28028, December 23. French, December 26, 1907.

1909.
15637, July 5. French, July 16, 1908.
23309, October 12. French, November 11, 1908.

1910.
9495, April 19. French, April 20, 1909.
10575, April 29. French, May 6, 1909.

"It should be noted that some of these are distinctly limited by the *purpose* being specified too closely. Thus, 221 of 1908 limits control to wing warping only, without reference to *aileron* control, nor to rudder control ; 1258 of 1908 refers only to rudder-tilting use of a lever. On the other hand, 28027 of 1908 distinctly specifies a system of control with *two* levers, and it is clear from drawings and specification that the system could not work with one only, nor is intended to be so worked. It is intended to be an improvement on the general method of 1258 of 1908, already limited to rudder only. The next one, 28028 of 1908, refers to single control, but for the *purpose* of wing-warping without deforming the beams or spars.

"Again, in 23309 of 1909 we have a rocking joy-stick for rudder control only ; while in 10575 of 1910 we have spring compensated single lever for movement both sideways and back and forth, for the purpose of varying *incidence* of main planes, and wing-warping, but not mentioning rudder control."

To this we added, on August 19, 1920, the following information :—

"Judgment was given in the Paris Courts on August 14 in four appeals by French constructors against the garnishee obtained by M. Esnault-Pelterie on sums owing to them by the French Government. The Judge decided that M. Esnault-Pelterie must, to a certain extent, be regarded as a creditor of the firms in question, in view of the decisions, regarding his patents covering the 'joy-stick,' already given by the Courts, but that the amounts which he was entitled to garnishee, from the sums owing by the State, must be reduced to more reasonable figures in view of the evidence produced. In the case of M. Gabriel Borel, the Judge ordered that the amount held in suspense under the garnishee order should be reduced from 138,000 francs to 55,000 ; in the case of MM. Farman Frères, from 1,250,000 to 400,000 ; in that of the Morane-Saulnier company from 5,000,000 francs to 2,000,000 ; and of Caudron Frères from 8,000,000 to 3,200,000 francs. In the Breguet case the Judge on August 10 ordered that the amount earmarked should be reduced from 16,000,000 to 4,000,000 francs."

It appears that at the moment the only firms who are in any way involved are those who, during the War, sent machines to France, and that no attempt has, as yet, been made to fight the matter in the British Courts. We rather think that, if this should be attempted, it would be found that the British patents held by R.E.P. are considerably more open to dispute than were the French. Nevertheless, the matter is one which will bear watching very closely, and if it is a question of having to pay a royalty on each machine, certainly the Government ought to reimburse the unfortunate constructors.

Royal Air Force Sports Board

THE following arrangements for June, 1923, are announced :—

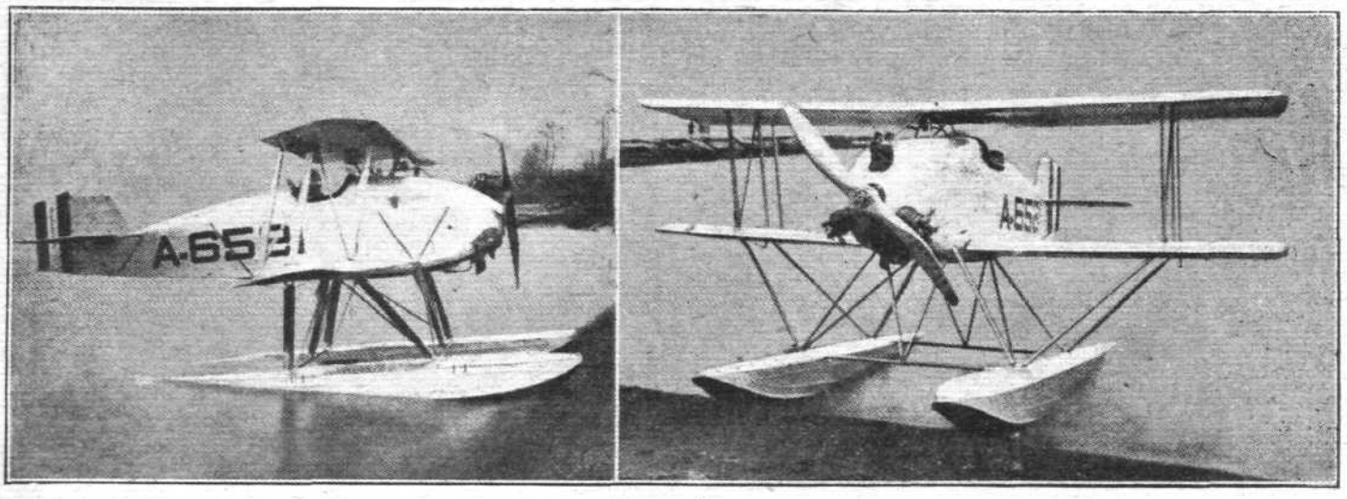
Saturday, 2nd, Golf, R.A.F. *v.* Worplesdon, at Worplesdon ; Saturday, 9th, Tennis, R.A.F. *v.* Queen's Club, at Queen's Club ; Friday, 15th, and Saturday, 16th, Cricket, R.A.F. *v.* R.A.O.C. at The Oval ; Saturday, 23rd, Tennis, R.A.F. *v.* Staff College, at Camberley.

THE MARTIN M.S.1 NAVY SHIPBOARD SCOUT

SOME successful tests were recently completed on Lake Erie with a new type of seaplane designed by the United States Navy and developed by the Glenn L. Martin Co. of Cleveland. It is known as the M.S.1, and is a very small tractor biplane seaplane for shipboard use. This machine is of all-metal construction except for the covering. It has a span of 18 ft., is 17 ft. 6 ins. long and 7 ft. 6 ins. high from the water-line, and its actual weight is less than 650 lbs. Notwithstanding its small size, it handles and manœuvres remarkably well, and has a performance comparing very favourably with larger, higher powered craft. Actual performance figures are not available, but it is stated that, considering it is a seaplane with but a 60 h.p. engine, its speed is quite high.

The pilot's cockpit, situated at the trailing edges of the wings, is roomy, and all the controls and instruments are readily accessible. Beyond radio equipment no military load is carried. The tail surfaces and wings are built up entirely of duralumin, channel sections being used largely for the bracing, while the ribs are stamped out of the material in one piece. Two-inch tubular duralumin is used for the wing spars, and the leading and trailing edges are of channel duralumin riveted to the ribs. The wings, tail surfaces and also the fuselage are covered with fabric.

Interplane bracing is by one set of N-struts on each side, the flying and landing loads being taken by diagonal struts between the floats and the outside of the lower wing. The



Two views of the Glenn Martin M.S.1 Navy Shipboard Scout. It is of metal construction, and has a Lawrance 60 h.p. engine.

The power plant is a Lawrence L.4S three-cylinder, 60 h.p., air-cooled engine driving a 6 ft. 6 ins. air-screw. The engine is mounted on a vertical bulkhead at the forward end of the rectangular section fuselage, which is built-up entirely of steel tubing. The method of assembling the fuselage is of interest. It is built up in a jig, the various members being held in position by special clamps until all the fittings have been made. This results in a perfectly rigid structure, which requires practically no truing up. The fittings themselves are quite simple, and are attached in place by rosette welding. This method of welding, which was developed at the Martin factory, consists of drilling holes through both the main members and the fittings and torch-welding the material around the radius of the holes. Tests on this type of fitting have shown exceptional strength for a minimum of weight.

lower wings are attached to the lower longerons of the fuselage, while the upper wings are attached at the centre to a short cabane. The machine is easily dismantled or assembled, and stowed away in a small space.

The construction of the floats is somewhat unusual. These are entirely of duralumin, the structure being built up of channel-section bracing with watertight bulkheads. The float fittings for the brace struts to the plane structure are aluminium-alloy castings. Sheet duralumin is used for the float covering; all joints are made watertight by the use of wicking, impregnated with marine glue, placed in the joints at the time of riveting. All interplane and float struts are streamlined with sheet duralumin. The petrol tank is of welded aluminium, and has a capacity of 12 gals.—or sufficient for a flight of two hours at full speed.

LONDON TERMINAL AERODROME

Monday evening, May 28, 1923

PASSENGER traffic still continues to keep at a high level, and, apart from the Paris line, which is invariably good, the Cologne and Amsterdam-Berlin routes are becoming much busier.

The Instone Air Line are now carrying big consignments of goods between London and Cologne. One of the contracts they have recently obtained is for 10,000 lbs. of jumper silk to be conveyed by air from Cologne to London, while in the opposite direction, in addition to motor-cycles, they are conveying large quantities of carpets and woollen goods. The K.L.M. are maintaining their goods traffic, especially from London to Holland, but I understand their principal energies are directed to the Amsterdam-Brussels route, where in one day last week they had no fewer than five machines completely filled with passengers in one direction alone. I am informed, also, that they are extending this service to Paris in the near future.

The Activities in "Joy-Riding"

"JOY-RIDING" has opened for the season, and the Surrey Flying Services are this year extending the scope of their operation over a wide area. Their new joy-ride station at Portsmouth did good business on Whit Monday, when over 100 passengers were carried. Each Sunday, also, a machine flies over from Croydon to Brooklands, and spends the day there taking up joy-ride passengers. Their station at Yarmouth is also doing good business, and preparations for the opening of other stations are being hurried forward. We are still awaiting the arrival of the first German machine to fly through from Berlin to London in a day, and, in the meantime, the bookings of passengers who wish to fly to Germany—either to Hambourg or Berlin are so numerous that negotiations are proceeding between the Daimler Airway and the Aero-Lloyd for the running of another London–Berlin through Daimler machine weekly. It is suggested that this shall leave London on Thursday, and return from Berlin on Friday. Among the passengers who travelled by Daimler machines to Amsterdam during the week were the Earl and Countess of Denbigh. The Earl, who is suffering from neuritis, and walked from the motor-car to the aeroplane with the aid of two sticks, was flying to Holland to consult a specialist, and, it is believed, to undergo special treatment that can be obtained only in that country.

The new tea-rooms and restaurant, which the Trust House have made in the old Officers' Mess, were opened on Whit Monday, and are forming quite an attraction at the aerodrome. The place is tastefully decorated and very comfortably furnished—so much so, in fact, that the old lounge is now practically deserted.

The Air Ministry have installed a new route-board in place of the one showing the progress of machines—which idea has been abandoned. The new board, which is much more accurate as a map, is printed in striking colours, and shows all the British air routes from Manchester to London, Amsterdam, Brussels, and Paris, and indicates the route onward to Berlin.

FLIGHT

THE ROYAL AIR FORCE

London Gazette, May 22, 1923.

General Duties Branch

The following are granted perm. commns. in ranks stated, with effect from dates indicated. *Gazettes* of those dates, apptg. these offrs. to short service commns., are cancelled :—Flying Offr. D. D'A. A. Greig, D.F.C.; Sept. 12, 1919. Observer Offr. A. P. Ledger, M.B.E.; Dec. 5, 1919 (since promoted).

The following are granted short service commns. in ranks stated, with effect from, and with seny. of, dates indicated :—Flying Offr. A. Sattin; May 9. Pilot Offr. on probn. R. H. Giles; May 14.

The following Lieuts. are granted temp. commns. as Flying Offrs. on seconding for four years' duty with the R.A.F.:—H. S. Hobby, M.C., E. Yorks. Regt.; May 8. J. R. Bowring, M.C., R.F.A.; May 14. Pilot Offr. A. C. Trendell resigns his short service commn.; May 23.

Stores Branch

The following are granted permanent commns. as Flying Offrs. for accountant duties, with effect from dates indicated. (Since promoted.) *Gazettes* of dates indicated in brackets, appointing these offrs. to short service commns., are cancelled :—F. W. Arthurton; March 5, 1921 (April 25, 1922). G. N. Simon; March 5, 1921 (March 15, 1921). Flying Offr. B. E. H. Wright is confirmed in rank; April 18.

Reserve of Air Force Officers

The following are granted commns. on probation in ranks stated in General Duties Branch (May 22) :—

Class A.—Flying Offrs.—A. M. Anderson, D.F.C., A. J. Bott, M.C., H. G. W. Debenham, J. W. Grose, H. A. Love, N. R. Melville, R. K. Rose, J. T. Rymer, H. Sanders, I. Welby, M.C., D.F.C., G. H. Welsh, D.F.C., H. A. Yeo.

Pilot Offrs.—E. D. Ayre, R. W. Barton, A. J. Brewin, J. P. Crawford, A. M. Dunlop, H. W. Frith, J. A. Harveyson, W. M. Hirons, H. Hollick-Kenyon, T. J. James, H. J. L. Jones, J. C. Montgomery, W. F. A. Snell, L. J. Tripp, W. L. Woodward.

Class C.—Pilot Offr.—T. P. Jenkins.

Memoranda

Lieut. R. A. C. Skipper relinquishes his temp. commn. on ceasing to be empld.; Oct. 11, 1919. Lieut. W. Murphy is deprived of permission to retain his rank on conviction by the Civil Power; Jan. 22.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Air Commodores: C. L. Lambe, C.B., C.M.G., D.S.O., to Half Pay List. 1.3.23. A. E. Borton, C.B., C.M.G., D.S.O., A.F.C., to R.A.F. Depot. 7.4.23, on transfer to Home Establishment pending disposal.

Squadron Leaders: L. J. E. Twisleton-Wykeham-Fiennes, to No. 2 Flying Training School, Duxford. 26.5.23. R. F. S. Morton, to Air Ministry. 1.6.23. A. S. C. Maclaren, O.B.E., M.C., D.F.C., A.F.C., to No. 1 School of Technical Training (Boys), Halton. 1.6.23, on transfer to Home Establishment. R. J. Mounsey, O.B.E., to Aircraft Park, India. 20.4.23.

Flight Lieutenants: A. G. Weir, to R.A.F. Staff College, Andover. 26.5.23. D. Gilley, D.F.C., to No. 2 Squadron, South Farnborough. 1.6.23. J. E. B. B. Maclean, D.S.C., to Aircraft Depot, Iraq. 14.3.23. W. E. C. B. C. Forsyth, to No. 8 Squadron, Iraq. 14.3.23. F. St. J. Woollard, A.F.C., to Headquarters, Palestine Command. 4.5.23. D. A. Stewart, M.C., D.F.C., A.F.C., to No. 7 Squadron, Bircham Newton. 1.6.23.

Flying Officers: W. S. Watson, to R.A.F. Base, Leuchars, No. 440 Flight. 29.4.23. A. Sattin, to R.A.F. Depot. 9.5.23, on appointment to a short service commission. E. C. Usher, to Experimental Section, R.A.E., South Farnborough. 1.6.23. S. T. Clemens, to R.A.F. Base, Calshot. 1.6.23. B. I. Carter, to R.A.F. Base, Gosport. 16.5.23, for duty in H.M.S. "Eagle" on commissioning. R. H. Daly, D.S.C., D.F.C., to No. 39 Squadron, Spittlegate. 14.5.23. A. G. Jarvis, A.F.C., to Stores Depot, Egypt. 3.5.23. R. de L. Stedman, to R.A.F. Depot. 14.5.23. (Non-effective pool.) S. H. Potter, to No. 100 Sqdn., Spittlegate. 14.5.23. A. Turner, M.M., to No. 11 Sqdn., Andover. 22.5.23. J. E. L. Drabble, to R.A.F. Depot. 14.5.23. (Non-effective pool.) E. T. O'N. Hogben, to No. 1 Flying Training School, Netheravon. 15.5.23, for course of instruction, on seconding from the Army. R. H. W. Empson, to No. 1 Sqdn., Iraq. 3.3.23. F. J. C. Rybot, to No. 55 Sqdn., Iraq. 14.3.23. T. W. Shortridge, to No. 30 Sqdn., Iraq. 14.3.23. H. S. Hobby, M.C., to No. 216 Sqdn., Egypt. 8.5.23, on seconding from the Army. H. J. Berthon, S. P. George, H. R. B. Howell, J. B. Knocker, G. McClintock, L. W. H. Phillips, H. V. Smith, D.C.M., F. P. Smythies, and O. K. Stirling Webb, all to No. 1 Flying Training School, Netheravon. 14.5.23, for course of instruction, on appointment to short service commissions. J. R. Bowring, M.C., to No. 1 Flying Training School, Netheravon. 14.5.23, for course of instruction on secondment from Army. A. P. C. Hannay, M.C., to No. 20 Sqdn., India. 18.4.23. G. F. E. Harrison, to Experimental Section, R.A.E., South Farnborough. 1.6.23.

Pilot Officers: G. E. Nicholetts, to R.A.F. Base, Leuchars, No. 440 Flight. 29.4.23. F. G. Cator, to R.A.F. Base, Leuchars, No. 440 Flight. 29.4.23. E. S. C. Vaughan, M.C., to No. 100 Sqdn., Spittlegate. 14.5.23.

F. Boston, A. R. Buchanan, H. I. Cozens, D. T. H. Hooke, A. S. Lewis, J. H. Pledger, J. R. Pocock, H. M. Scholefield, R. T. Taaffe, and N. J. Wiltshire, all to No. 1 Flying Training School, Netheravon. 14.5.23, for course of instruction, on appointment to short service commissions. A. Thomson, to No. 11 Sqdn., Andover. 22.5.23. R. H. S. Spaight, to No. 24 Sqdn., Kenley. 21.4.23, on appointment to a permanent commission from R.A.F. Cadet College, Cranwell. J. G. Shackleton, W. A. C. A. Yearsley, C. Denison, G. F. Reeves, and M. B. F. Watson, all to R.A.F. Depot. 12.5.23, pending disposal. L. Young, to R.A.F. Base, Leuchars. 22.5.23, pending disposal.

Stores and Accountants' Branch

Wing Commander T. O. Lyons, O.B.E. (Stores), to No. 3 Group, Headquarters, Spittlegate. 14.5.23, for Technical Staff duties.

Squadron Leader L. Auker, O.B.E. (Stores), to R.A.F. Depot (non-effective pool). 11.3.23, on transfer to Home Establishment.

Flying Officers (Stores): W. C. Farley, to R.A.F. Base, Gosport. 15.5.23. W. J. Eagle, to Base Supply Depot, Iraq. 7.4.23, on appointment to a short service commission. H. T. H. Copeland, to No. 1 School of Technical Training (Boys), Halton. 22.5.23.

Flying Officer (Accountant): A. J. Moore, to Aircraft Depot, Iraq. 11.4.23.

Medical Branch

Flight Lieutenants: W. G. L. Wambeck, to R.A.F. Depot. 26.3.23, on transfer to Home Establishment. T. Sheehan and K. R. Smith, M.D., D.P.H., both to Research Laboratory and Medical Officers' School of Instruction, Hampstead. 25.4.23. H. H. R. Bayley, to Research Laboratory and Medical Officers' School of Instruction, Hampstead. 27.4.23. R. S. Topham, M.B., D.P.H., to R.A.F. Central Hospital, Finchley. 9.5.23. T. Sheehan to Headquarters, Coastal Area. 7.5.23. E. D. D. Dickson, M.B., F.R.C.S. (E), to Research Laboratory and Medical Officers' School of Instruction, Hampstead, on appointment to Short Service Commission. 2.5.23. K. R. Smith, M.D., D.P.H., to Headquarters, Coastal Area. 7.5.23. H. H. R. Bayley, to R.A.F. Depot. 14.5.23. E. D. D. Dickson, M.B., F.R.C.S. (E), to No. 1 School of Technical Training (Boys), Halton. 14.5.23, for duty as Medical Officer at R.A.F. Hospital, Halton. T. C. St. C. Morton, M.D., D.T.M., T. M. Walker, and H. Steele (Q.Mstr.Med.), all to Headquarters, Palestine Command. 5.5.23, pending disposal.

Flying Officer: J. B. Gregor, to Research Laboratory and Medical Officers' School of Instruction. 30.4.23, on appointment to a Short Service Commission.

C. F. Pitt (Dental), to No. 1 Flying Training School, Netheravon. 7.5.23.

Chaplains' Branch

Rev. J. R. Walkey, M.A., to Aircraft Depot, Iraq. 1.3.23. Rev. C. O. R. Wormald, M.A., to No. 5 Flying Training School, Shotwick, on appointment to Short Service Commission. 16.4.23.

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Independent Air Force Reunion Dinner

THE fifth annual reunion dinner of the Independent Force (Royal Air Force), including all officers of Army troops and other attached units will be held at the Hotel Cecil on Tuesday, June 26 (at 7.45 p.m. for 8 p.m.), when Air Chief Marshal Sir Hugh M. Trenchard, Bart., K.C.B., D.S.O., A.D.C., will take the chair. For the information of eligible officers who have not received a circular *re* above, it may be stated that tickets, price 15*s.* (excluding wines), may be obtained from the Hon. Secretary, I.F. (R.A.F.) Dinner Club, Room 546, Adastral House, Kingsway, W.C. 2.

R.A.F. (Middle East) Reunion Dinner

SIR GEOFFREY SALMOND will preside at a reunion dinner of R.A.F. officers who served in the Middle East during the War, which is to be held on June 6 at the Café Royal, and Major-General Sir W. S. Brancker, Director of Civil Aviation, and Major-General Sir E. Ironside will also be present.

The Royal Tournament

ALL roads just now lead to Olympia, where the great Hall is crowded twice daily by enthusiastic audiences. It is hardly surprising, as the fortieth great Tournament is in full swing, with a more attractive series of items than we ever remember seeing before. At every performance the skill displayed by representative teams from the various regiments is simply amazing. As in past years, there is the splendid Royal Naval and Royal Marine Interport Field-Gun Competition, displays of physical training from Aldershot, remarkable driving by the Royal Army Service Corps, and the very beautiful musical ride. This year it is the 12th Royal Lancers (Prince of Wales's) which hold the audience's attention, and they, with their double ride, if anything, excel previous exhibitions of late years. Maybe that it is the effect, the play of the lances and pennants, that appeals. At least, the enthusiasm and applause evoked are very spontaneous, and it may be safely said that no more beautiful spectacle of a like nature has been seen.

The grand pageant is an attractive item on the programme, this year devoted to "Scotland in Arms," the theme being founded on Sir Walter Scott's "Lady of the Lake." It is a highly entertaining and descriptive review of Scottish military history, going back to the sixteenth century, and is alone worth a visit to Olympia. Another number is a realistic night scene formed by the introduction of a Zeppelin in a bombing attack on London. The conception is well carried out, and many who may not in the years of the War have had the "luck" to form part of the audience in the real thing, can gain a very fair idea of what the happenings were in those times of "Take shelter." The staging of this part of the programme reflects considerable credit upon its "perpetrators."

With certain variations, the main features of the Tournament will be enacted twice a day up to June 9 only, and therefore there is no time to lose in securing seats for this national and magnificent display. And to think of it: every penny of profit, except what the Government annex in the form of taxes, goes to help the Naval, Military and Air Force charities, in this way no less a sum than £117,000 having already been contributed.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS
(London Aero Models Association)

"GAMAGE" Cup Competition, held on Wimbledon Common

A highly successful competition for the above Trophy was held by the above on Whit Monday. The wind was a trifle bumpy, but 12 enthusiastic members turned out, with five different types of machines, and an interesting competition resulted. Mr. Houlberg, flying one of his old floating tail type twin pushers, led off with a very fine steady flight of 88 secs., Mr. Hersom following with his record-breaking twin pusher, with 56 secs. Enclosed models were well in evidence, along with spar tractors. Among the latter Mr. Burchell, as usual, put up three splendid steady flights, Mr. Davis also doing well. Naturally, the indefatigable Mr. Pavely turned up, with a C.A. 'bus, which got away in great style for a nice clear flight of 33⅘ secs.

In the second round Mr. Houlberg unfortunately had rather a nasty smash in winding up, but was not dismayed. His spar was completely broken in two, but he effected a most workmanlike repair in time to finish his three attempts, and thus, as results show, to save the situation as far as he was concerned. Mr. Hersom followed with 44⅘ secs., Messrs. Woolley, Burchell, Davis, Johnson and Mrs. Burchell also plodding along steadily. Unfortunately, Mr. Pavely's model crashed in the second round, after a flight of only 5 secs., in spite of which fact he still appeared fourth in the list when results were ascertained. His machine, by the way, carried about 12·9 ozs. per sq. ft. Mr. Hersom ended his attempt with a third flight of 66⅘ secs. All other competitors flew, and the competition was completed by 4.30 p.m., when members indulged in a great deal of practice flying. The competition as a whole was a splendid display of all types of machines, and undoubtedly many ***habitués*** of Wimbledon Common spent an interesting afternoon. The results are as follows :—

Name and Type.	Duration in Secs. 1.	2.	3.	Loading. A. 1 oz. per sq. ft.	Average duration in Secs.	Points
1. Mr. Burchell (Spar Tractor)	58⅘	37	47⅘	5·367	47·73	256·18
2. ,, Houlberg (O-1-1-P²)	88	5	51	4·46	48·00	214·08
3. ,, S. C. Hersom (Twin Pusher)	56	44⅘	66⅘	3·406	55·73	189·49
4. ,, Pavely (C.A. Tractor)	33⅘	5	—	12·90	12·8	165·12

Other competitors scored as follows :—

	Points.
Mr. Woolley (Enclosed Tractor)	129·43
,, W. Davis (Spar Tractor)	122·22
,, Johnson (Twin Pusher)	105·16
Mrs. Burchell (Spar Tractor)	77·86
Mr. Green (Enclosed Tractor)	74·55
,, Howes (Enclosed Tractor)	55·47

Mr. H. G. Davis also put up a splendid show, but was unfortunately disqualified.

A. E. JONES, Hon. Sec.

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Glenn Curtiss in England

GLENN H. CURTISS, the Pioneer American aeroplane designer and constructor, who arrived at Southampton on the 26th inst., in the *Olympic*, from New York, is paying a two-months' visit to Europe.

Amundsen's Flight to the North Pole

IT has been decided that Capt. R. Amundsen and Pilot Omdahl will start on the attempt to fly over the North Polar basin on or about June 20. The taking-off point will be from Wainwright, Alaska, and it is intended to land at Spitzbergen. Arrangements are being made to send a patrol ship, carrying two hydro-aeroplanes, to the ice edge for the purpose of meeting Amundsen and escorting him in the final stages of his flight. The Norwegian Government have voted 60,000 kr. (£3,333) for this purpose.

Gulf of Mexico to Canada.

ON May 26th Lieut. Crocker made a splendid non-stop flight from the Gulf of Mexico to the Canadian border in a D.H.4, a distance of 1,400 miles. Starting from Ellington Field, Houston, Texas, Crocker arrived at Selfridge Field, Michigan, 12 hours later.

A Bordeaux-Lisbon Service.

A NEW air service, from Bordeaux to Lisbon, *via* Madrid, was opened last week by the Latécoère Air Line Co. M. Pierre Latécoère, the Director of the Company, left Bordeaux at 4 a.m. on May 25th on the first machine, travelling to Madrid *via* Bayonne, Vittoria and Valladolid.

PUBLICATIONS RECEIVED.

Aeronautical Research Committee, Reports and Memoranda :

No. 796 (F. 2). The Possible Causes of Fire in an Aeroplane Crash and Means to Lessen Fire Risk. January, 1922. Price 1*s.* 6*d.* net. By post, 1*s.* 6½*d.*

No. 805 (Ae. 58). Some Calculations Dealing with the Disturbed Motion of an Aeroplane, with Special Reference to Landing. By L. W. Bryant, B.Sc. December, 1921. Price 6*d.* net. By post, 7*d.*

No. 812 (Ae. 63). Experiments on Rigid Airship R.32. By J. R. Pannell, R. A. Frazer and H. Bateman. April, 1921. Price 1*s.* net. By post, 1*s.* 1*d.*

No. 815 (Ae. 66). Measurements of Normal Force and Pitching Moment on Rigid Airship R.33. By R. A. Frazer and H. Bateman. April, 1922. Price 1*s.* 3*d.* net. By post 1*s.* 4*d.*

No. 808 (Ae. 60). Pressure Plotting on Fin and Rudder of a Model of R.32. By D. H. Williams, B.Sc., and A. H. Bell. March, 1922. London : H.M. Stationery Office, Kingsway, W.C. 2. Price, post free, 2*s.* 1½*d.*

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AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations : cyl = cylinder ; I.C. = internal combustion ; m. = motor
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1921

Published May 31, 1923

28,869. PAXTON GYROSCOPE CORPORATION. Gyroscopic apparatus. (170,864.)
29,517. B. THOMSON and H. G. HAWKER ENGINEERING COMPANY, LTD. Wings of aeroplanes, seaplanes, etc. (196,949.)
32,824. J. LAMBIE. Dynamical propulsion of aircraft, etc. (196,961.)

APPLIED FOR IN 1922

Published May 31, 1923

2,411. G. BREZZI. Method of connecting wing spars to uprights and diagonals. (196,978.)
2,651. G. F. BUCKLE and F. PARFETT. Course indicators. (196,983.)
3,214 and 3,215. C. BARADAT and F. E. ANGLADA. Rotary I.C. engines. (197,009 and 197,010.)
4,192. FORD INSTRUMENT COMPANY. Gyroscopic compasses. (175,292.)
4,347. C. G. NEVATT. Rotary engines. (197,057.)
5,496. H. O. SHORT. Fuselages. (197,092.)
6,758. A. FLETTNER. Screw propellers. (176,791.)
8,806. F. M. DEAN. Wind-screen clamping devices. (197,148.)
10,360. SOC. DES MOTEURS GNOME ET RHONE. I.C. engines. (178,827.)
12,227. SOC. RATEAU. I.C. engines. (179,926.)
14,992. L. M. HAMILTON, C. L. JOLY and G. A. POLLOCK. Rotary I.C. engines. (197,210.)
18,084. A. RATEAU. Means for increasing feed pressure in I.C. engines. (182,787.)
24,855. LUFTSCHIFFBAU ZEPPELIN GES. Connection of metal plates. (186,330.)
31,015. SOC. ANON. DES AEROPLANES G. VOISIN. Pistons. (191,706.)

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